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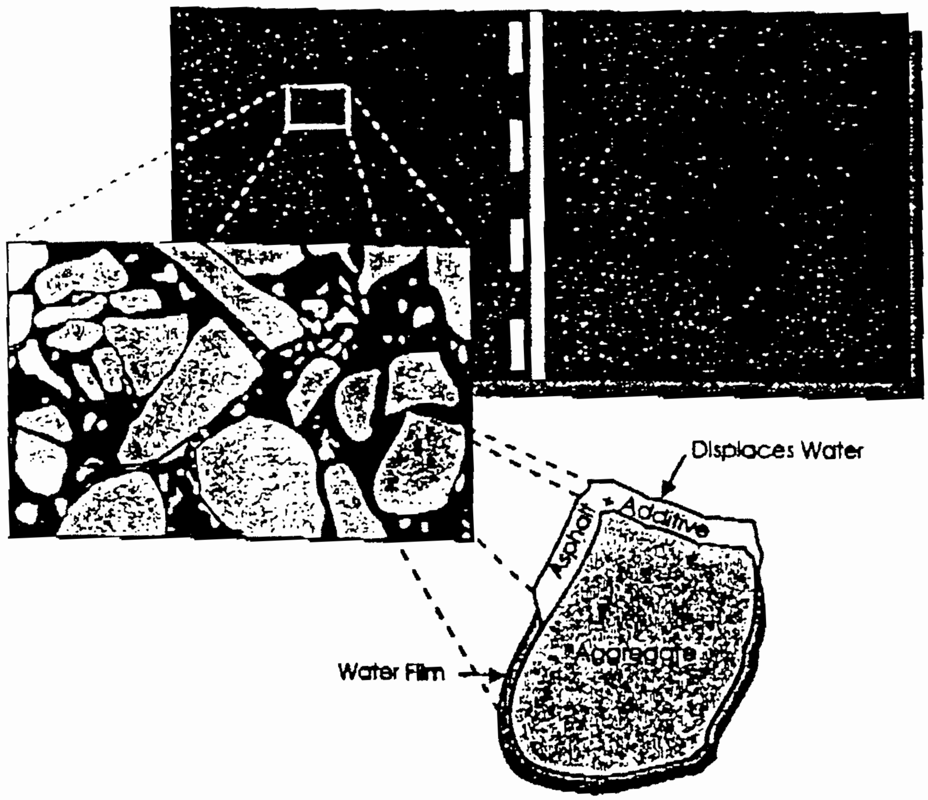
FINAL REPORT

EFFECTIVENESS OF ANTISTRIPPING ADDITIVES IN THE FIELD



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VTRC
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Effectiveness of Antistripping Additives in the Field

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Supplementary Notes

Abstract

Stripping has long been recognized as a cause of asphalt pavement damage. Water may get between the asphalt film and the aggregate surface, causing an adhesive failure, or water may combine with the asphalt to affect the cohesive strength of the material. Various types of antistripping additives have been used in the attempt to alleviate or eliminate stripping. The Virginia Department of Transportation has used antistripping additives in some of its asphalt mixes since the 1960's. In the 1980's hydrated lime was found to outperform several chemical additives. VDOT began to require asphalt contractors to use chemical additives that produced test results equal or superior to hydrated lime. Presumably, chemical additives were then improved to compete with hydrated lime. This study was undertaken to find if the new generation of additives prevented stripping in Virginia's hot mix asphalt.

Twelve test sections were established, 9 using chemical additives and 3 containing hydrated lime. After 3 to 4 years, eight of the sections containing chemical additive demonstrated considerable visual stripping in cores. The sections containing hydrated lime showed much less stripping. The TSR test used on mix sampled during construction did not accurately predict the stripping that occurred. A follow-up survey of existing pavements should be conducted to verify the possible inadequacy of some chemical additives. Also, the TSR test should be examined and possibly modified to more closely duplicate Virginia's environmental conditions.

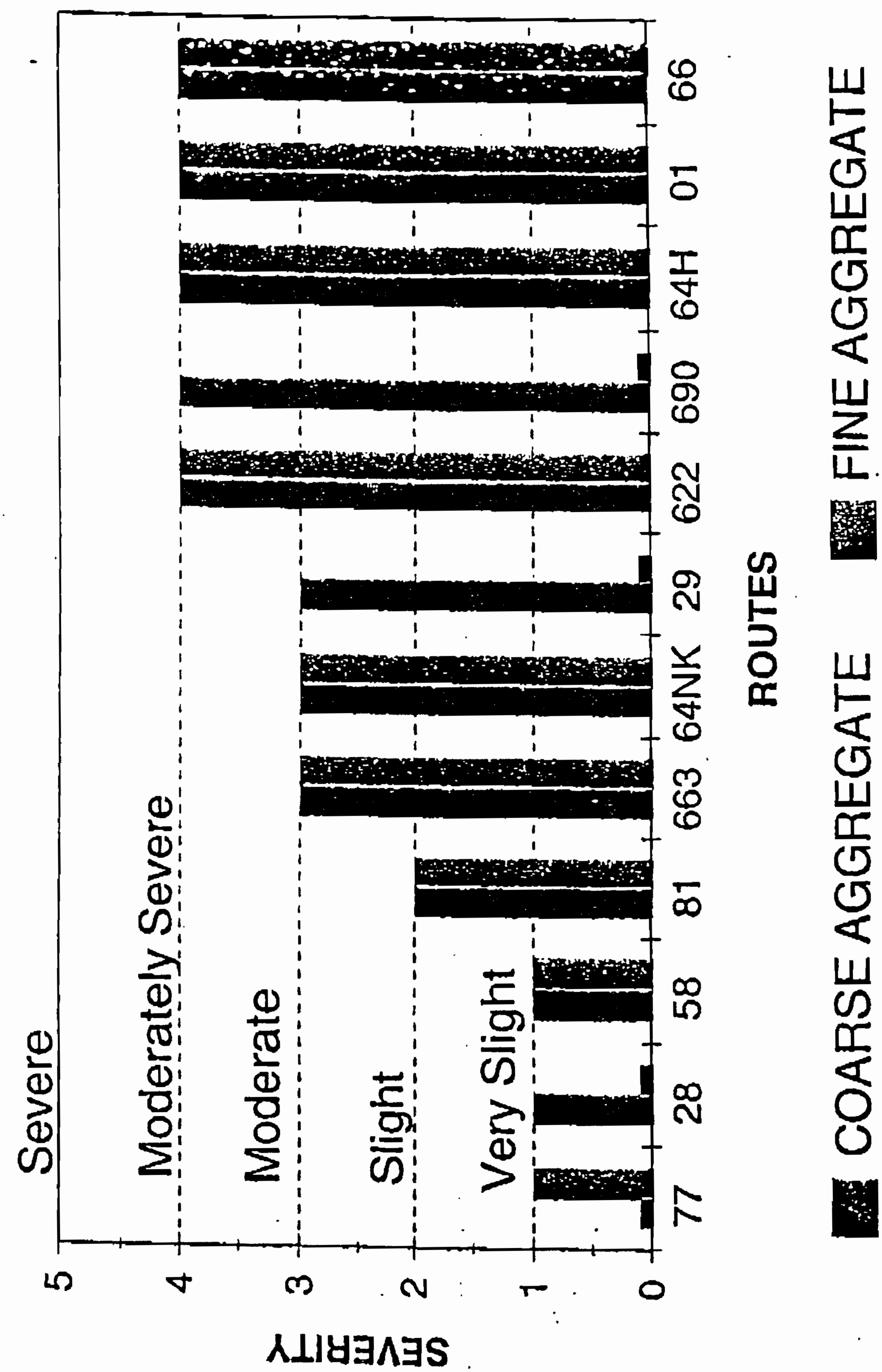
SEVERITY
0
1
2
3
4
5
Severe
Moderately Severe
Moderate
Slight
Very Slight
77
28
58
81
663
64NK
29
622
690
64H
01
66
ROUTES
COARSE AGGREGATE
FINE AGGREGATE

Table 3. Results

Route	Mix	Final Voids, Percent	TSR	Boil Test	Additive	Aggregates		Field Stripping Eval. *	
						Coarse (+4.75 mm)	Fine (-4.75 mm)	C. A. Coarse agg	F. A. Fine agg
58	SM-2C	7.2	0.94	Pass	Hyd. Lime (L)	Granite	Nat. Sand	1	1
I-64H	SM-2C	5.5	0.91	Pass	Adhere HP Plus (C1)	Metarhyolite	Quartz Sand	4	4
29	SM-2C	4.6	0.99	Pass	AS Special (C2)	Aplite	Aplite and quartz sand	3	0
1	SM-2C	7.6	0.71	Pass	Adhere HP Plus (C1)	Granite	Granite and natural sand	4	4
28	SM-2C	7.7	0.94	Pass	ACRA-2000 (C3)	Diabase	Another diabase	1	0
I-64 NK	SM-2C	7.2	0.96	Pass	Adhere HP Plus (C1)	Metarhyolite	Natural Sand	3	3
I-66	SM-2C	5.5	0.91	Pass	Kling Beta 2600 (C4)	Siltstone	Siltstone and Natural Sand	4	4
I-77	SM-2C	5.6	0.91	Pass	Hyd. Lime (L)	Granite	Granite and Natural Sand	0	1
I-81	SM-2C	6.6	0.93	Pass	Hyd. Lime (L)	Diabase	Diabase and Natural Sand	2	2
663	SM-2C	3.1	0.93	Pass	Kling Beta 2600 (C4)	Diabase	Diabase and Natural Sand	3	3
622	SM-3A	NA	0.93	Pass	Kling Beta 2600 (C4)	Siltstone	Siltstone and Natural Sand	4	4
690	SM-3A	NA	0.93	Pass	101-25-B Exxon (C5)	Diabase	Diabase and Natural Sand	4	0

* Scale: 0 = no stripping
5 = 100 percent stripped

If visual stripping indicates potential performance, the present chemical additives are not as effective as was hoped. The pavements did not strip to the point of total disintegration, but the loss of adhesion observed by the visible stripping should result in decreased fatigue life and durability. Conclusions could not be reached concerning particular brands of additives since not enough projects containing single brands could be included in this study.

Neither the TSR test nor the boiling test showed satisfactorily which mixes would strip. None of the mixes failed the boiling test and only one mix that stripped had an unacceptable TSR. Possibly additives may be effective over the short term for the duration of the test but not over the long term in pavement service. The extremely poor correlation of field observation with prediction of stripping by the TSR test was disappointing.

Aschenbrener[10] compared several variations of the TSR test to field performance of mixes in Colorado. Variations of the procedure that changed the degree of severity included the aging of the mix before compaction, degree of saturation, and inclusion of a freeze cycle. None of the variations predicted performance perfectly. The variation closely resembling VDOT's TSR test identified those mixes that performed well and those that disintegrated but did not identify those mixes that required high levels of maintenance. A more severe test variation including a higher level of saturation and a freeze cycle did identify mixes needing high levels of maintenance. It was suggested in the report that Colorado adopt two levels of severity for their testing to match the variety of environmental and traffic conditions in the state.

Although Virginia does not have the same environmental conditions as Colorado, it is possible that a more severe test procedure is necessary. Consideration should be given to increasing the severity of the test method and further verifying the effectiveness of chemical additives over the long term.

CONCLUSIONS

1. Eight of nine projects containing chemical antistripping additives showed considerable visual stripping after three to four years of service.

2. All of the three projects containing hydrated lime showed less stripping than the projects containing chemical additives.

3. The TSR test did not accurately predict the visual stripping observed in the mixes after three to four years.